CLAIMS

1. Method for detection of contamination by specific microorganisms through the application of the evanescent field of a sensitive fiber optic characterized by the stages of:

(a) exposing the evanescent-field of the sensitive fiber optic using an appropriate technique based on physical and chemical properties;

(b) permitting the immediate contact of the exposed evanescent-field obtained in the stage (a) with the sample to be examined, with the aforementioned sample having a form adequate so as to obtain the generation of an optical signal in response to the presence of microorganisms in the sample:

(c) demodulating the optical signal generated in stage (b) and using this value to quantify the microorganisms through an appropriate method.

2. Method in accordance with claim 1 wherein the appropriate technique for stage (a) is chemical etching performed with a strong acid.

3. Method in accordance with claim 2 wherein the strong acid is hydrofluoric acid.

4. Method in accordance with claim 3 wherein the time of treatment and the concentration of the hydrofluoric acid solution is adjusted in a manner to permit the

etching of the sheath of the fiber optic until it approaches a thickness of 0.5 a 1 μm from the core.

5. Method in accordance with claim 4 wherein the time of treatment is 11 minutes and the concentration of the acid is 38%.

6. Method in accordance with claim 1 wherein the sample to be examined is in a support containing the culture medium appropriate to permit the growth of microorganisms.

7. Method in accordance with claim 6 wherein the support is a Petri dish containing Agar medium and specific nutrients.

8. Method in accordance with claim 6 wherein reactants are incorporated to the culture medium capable of altering the properties of the culture medium in a manner as to permit a better detection of the index of refraction of the microorganisms.

9. Method in accordance with claim 1 wherein the sensitive fiber has integrated to itself one or more concentric layers of a material selected from the group consisting of dielectricals, metallics, superconductors or semiconductors in a manner so as to alter the transversal spatial distribution of the evanescent-field and thus optimizing the contact with the medium containing the specific microorganism.

10. Method in accordance with claim 9 wherein the material is a polymer selected from a group consisting of polyvinyl chloride, polyurethanes, polyureas and polyesters.

11. Method in accordance with claim 1 wherein the monitoring of the environment is to occur in real time.

12. Composition for the use in the detection of microorganisms characterized by comprising a selective culture medium for the microorganism to be detected and reactants capable of altering the properties of the medium in a manner as to favor the interaction of the system fiber-microorganism.

13. Composition in accordance with claim 12 wherein the alteraction is in the index of refraction of the system.

14. Device for the survey of microorganisms through the insertion of a sensitive fiber optic (11), with an adequately exposed evanescent-field, into a surface or volume of a biological culture medium (12) specific for the microorganism to be detected, characterized by comprising the following system for demodulation based on a fiber optic circuit and related components:

optical source (1), coupling to an optical fiber of the 2x1 type (2), coupling to an optical fiber of the 2x2 type (5), an optical fiber extension (8) termed sensitive element containing a polarization

controller (10), a segment of sensitive optical fiber (11) with the exposed evanescent-field being in direct physical contact with the biological culture medium (12), an extremity (15) from which exits the light that enters the photodetector (16), another extension of optical fiber (9) termed reference element containing a polarization controller (17), an extremity (18) from which exits the light that enters the photodetector (19) in a manner as to compose a device that functions based on the modulation of the intensity (or amplitude) of light.

15. Device for the survey of microorganisms through the insertion of a sensitive fiber optic (11), with an adequately exposed evanescent-field, into a surface or volume of a biological culture medium (12) specific for the microorganism to be detected, characterized by comprising the following system for demodulation based on a fiber optic circuit and related components:

i) optical source (1), coupling to an optical fiber of the 2x1 type (2), coupling to an optical fiber of the 2x2 type (5), an optical fiber extension (8) termed sensitive element containing a polarization controller (10), two connection links (13) and (14), a segment of sensitive optical fiber (11) with the exposed evanescent-field being in direct physical contact with the biological culture medium (12) and having both semi-reflective extremities localized at points (13) and (14), an extremity (15) from which exits the light that enters the photodetector (16), another extension of optical fiber (9) termed

reference element containing a polarization controller (17), an extremity (18) from which exits the light that enters the photodetector (19) in a manner as to compose a device that functions based on the modulation of the complete phase of light of the Fabry-Perot type interferometer.

16. Device for the survey of microorganisms through the insertion of a sensitive fiber optic (11), with an adequately exposed evanescent-field, into a surface or volume of a biological culture medium (12) specific for the microorganism to be detected, characterized by comprising the following system for demodulation based on a fiber optic circuit and related components:

optical source (1), coupling to an optical fiber of the 2x1 type (2), coupling to an optical fiber of the 2x2 type (5), an optical fiber extension (8) termed sensitive element containing a polarization controller (10), a segment of sensitive optical fiber (11) with the exposed evanescent-field being in direct physical contact with the biological culture medium (12), an extremity of reflective optical fiber (15), another extension of optical fiber (9) termed reference element containing a polarization controller (17) and a extremity of reflective optical fiber (18), an extremity of optical fiber (3) from which exits the light that enters the photodetector (4) and an extremity of optical fiber (6) from which exits the light that enters the photodetector (7) in a manner as to compose a device that functions based

on the modulation of the complete light phase of the Michelson type interferometer.

17. Device for the survey of microorganisms through the insertion of a sensitive fiber optic (11), with an adequately exposed evanescent-field, into a surface or volume of a biological culture medium (12) specific for the microorganism to be detected, characterized by comprising the following system for demodulation based on a fiber optic circuit and related components:

optical source (1), coupling to an optical fiber of the 2x1 type (2), coupling to an optical fiber of the 2x2 type (5), an optical fiber extension (8) termed sensitive element containing a polarization controller (10), a segment of sensitive optical fiber (11) with the exposed evanescent-field being in direct physical contact with the biological culture medium (12), an extremity of optical fiber (15) directly linked to the extremity of optical fiber (21) belonging to the coupling of the optical fiber of the 2x2 type (20), an extremity of optical fiber (25) from which exits the light that enters the photodetector (23), another extension of optical fiber (9) termed reference element containing a polarization controller (17), an extremity of optical fiber (18) directly linked to the extremity of optical fiber (22) and an extremity of optical fiber (26) from which exits the light that enters the detector (24) in a manner as to compose a device that functions based on the modulation of the complete light phase of the Mach-Zehnder type interferometer.

18. Device in accordance with claim 14 wherein the sensitive optical fiber (11) contains a Bragg grating engraved within its core in a manner as to compose a device that functions based on the modulation of the length of the light wave.

19. Device in accordance with claim 14 wherein the sensitive optical fiber (11) consists of a high birefringency fiber of the type that maintains polarization in such a manner as to compose a device that functions based on the modulation of the polarization of light.

20. Device in accordance with claim 14 wherein the sensitive optical fiber (11) consists of a high birefringency fiber of the type that maintains polarization containing a Bragg grating engraved within its core in a manner as to compose a device that functions based on the modulation of the length of the light wave and/or light polarization.